Increasing Children's Time Spent Outdoors Reduces the Incidence of Myopia

Citation

He M, Xiang F, Zeng Y, et al. Effect of Time Spent Outdoors at School on the Development of Myopia Among Children in China: A Randomized Clinical Trial. JAMA. 2015; **314**(11):1142-8.

Context

The epidemic of myopia has been well-documented in urban East Asia, exceeding 80% in school leavers with evidence suggesting moderate rises elsewhere.[1] Given the strong link between myopia and sight-threatening pathology,[1] how myopia can be curbed has become a major topic of public health interest. This has sparked research to identity modifiable factors, with increased time outdoors consistently shown to prevent myopia.[2] This randomised control trial is the largest to investigate the efficacy of increasing the time children spend outdoors in the prevention of myopia.

Methods

Primary schools (n=30) in Guangzhou, China were divided into 6 strata according to uncorrected visual acuity (VA), a proxy for the prevalence of myopia within each school. Two matched schools were selected from each stratum and allocated to either the control (n=6) or intervention arm (n=6). The intervention consisted of a compulsory 40 minute outdoor class at the end of the school day with educational measures such as parental newsletters and promotional items, aimed at increasing children's time outdoors outside of school hours. Children in grade 1, aged 6-7 years were examined at baseline (intervention n=919, control n=929) and followed up for 3 years (follow up rate: intervention 95% and control 96%). Annual measures included; VA, ocular biometry, cycloplegic refraction and daily time outdoors by questionnaire. Outcome measures were incident myopia ≤-0.50 dioptres (D) and change in spherical equivalent.

Findings

Intervention and control schools were well-matched at baseline but, the proportion of children with myopic parents was higher in the control group ($p<.0001$). The 40 minute outdoor class was successfully implemented in the intervention schools (estimated compliance of 83.5%) with non-compliance generally attributed to poor weather. However, intervention strategies to increase time outdoors after school were not successful. With just the extra 40 minutes per day, the 3-year cumulative incidence of myopia was significantly lower in the intervention (30.4%) compared with the control group (39.5%, $p<.0001$), remaining significant after adjustment for parental myopia. There was also a significant reduction in spherical equivalent change in the intervention group (-1.42 D vs. -1.59D, $p=0.04$).

Commentary

This well-conducted trial presents a timely next step in the investigation of time outdoors, supporting positive results from smaller trials.[3,4] However, the impact of the intervention on myopia development, although significant, is smaller than anticipated given the strong results from longitudinal epidemiological studies.[5,6] This is probably due to the modest increase in outdoor time (40

minutes/day). A previous 1 year trial using 80 mins/day outside reduced incidence by almost 50%,[3] indicating that more time outdoors results in an even greater reduction in incidence (non-linear dose-response relationship). While the current result remains valid and any delay in onset may prevent progression to high myopia, this highlights the need for further trials to determine optimal duration and whether time outdoors can reduce progression, which are essential for clinical recommendations. A further limitation is the failure of the parental education program to enact a change in behaviour. Barriers to increasing time outdoors after school warrant investigation and future research should look at specifically targeting these. As the protective effect of time outdoors has been reported in various locations and ethnicities, these results are likely to be generalisable. However, in locations with low prevalence, the impact of interventions may be small, while, where the pressures of education systems are high, this may counter public health advice. As such, the implementation of similar trials in other locations is necessary.

Implications for practice

These findings form the basis of an important public health message as increasing the time children spend outdoors is likely to not only have a positive impact on refractive development but, also widespread health benefits. Clinically, health professionals are well-placed to help spread this message, particularly for parents with low-moderate levels of myopia who may be able to prevent their children from becoming myopic through early intervention. For those children who are already myopic, it remains uncertain whether increasing outdoor time will reduce progression rate and this should be the focus of future research.

References

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